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ABSTRACT

Learning disabled, emotionally disturbed, and unclassified male students originally tested with the Elizur Test of Psycho-Organicity (ETPO) when they were 6 to 11 years of age (time 1), were reassessed four years later (time 2) with the same instrument. Examinees were required to duplicate geometric and colored block designs, and to memorize five digit numbers. As predicted, the total ETPO score at time 1 was found to significantly differentiate and the three classification groups at time 2. Further, a significant correlation ratio of .49 was obtained between ETPO total score at time 1 and classification status at time 2. Also as predicted, the total ETPO score at time 2 significantly differentiated the three classification groups, and a significant correlation ratio of .55 was obtained, indicating that ETPO performance at time 2 was related to classification status at time 2. Classification equations were derived from multiple discriminant analyses. When cross-validated, these analyses reveal an overall hit rate of 61% for the predictive study, and 70.7% for the concurrent study for a combined emotionally disturbed and learning disabled group. (Author/CP)

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THE PREDICTIVE AND CONCURRENT VALIDITY OF THE ELIZUR TEST OF PSYCHO-ORGANICITY

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ABSTRACT

Learning disabled, emotionally disturbed, and unclassified male students (N=123) originally tested with the Elizur Test of Psycho-Organicity (ETPO) when they were 6 to 11 years of age (Time 1), were followed-up and reassessed four years later (Time 2) with the same instrument. The total ETPO score at Time 1 was found to significantly differentiate the three classification groups at Time 2. Further, a significant correlation ratio of .49 was obtained between ETPO total score at Time 1 and classification status at Time 2. The total ETPO score at Time 2 significantly differentiated the three classification groups, and a significant correlation ratio of .55 was obtained, indicating that ETPO performance at Time 2 was related to classification status at Time 2. Classification equations were derived from multiple discriminant analyses. When cross-validated, these analyses reveal an overall hit rate of 61% for the predictive study, and 70.7% for the concurrent study for a combined ED and LD group.

The Elizur Test of Psycho-Organicity (ETPO; Elizur, 1959) is a broad-based instrument which was originally designed to measure organicity but which has shown promise as a screening instrument for identifying learning disabilities in elementary and secondary level students (Elizur, 1969; Jackson, 1975; Brooks, 1976). The purpose of this study was to investigate the effectiveness of the ETPO in identifying learning disabled children over a four year period.

The ETPO consists of four subtests: Designs, Blocks, and two Digits subtests, in two forms (Children, through age 9, and Adult, age 10 and over). The Designs subtest requires subjects to graphically reproduce geometric patterns from memory after an initial five second presentation. Different sets of designs are used in the Childrens' and Adults' forms. The Blocks subtest consists of a sample and four test designs, which subjects are required to duplicate using colored blocks. The models are either constructed by the examiner, for the Childrens' form, or presented in a booklet for the Adult form. These items are timed. The Digits subtests (Digits I and Digits II) are each comprised of two sets of ten, four-digit numbers (Childrens' form) or two sets of ten five-digit numbers (Adult form). The testee is presented the digits orally and required to repeat them after presentation. Digits I and II are considered two separate subtests since Elizur expected organic populations to deteriorate on the second set of digits. The scoring of the ETPO is objective and involves the tabulation of errors for each of the four subtests, plus a total test score.

Several studies have investigated the validity of the ETPO for organic populations, with some success (Elizur, 1959, 1965; Kraus, 1970). However, in 1975 Jackson undertook a study of the ETPO with children aged 7 to 11 years to determine whether the instrument would effectively differentiate between learning disabled (LD) and unclassified (UC) students. Jackson used 20 learning disabled males, representing all the children attending four special education classes in

a suburban southern New Jersey school district. All of these children had been classified as "learning disabled" by the school district's child study team. Twenty unclassified children were randomly sampled from the population of all male students attending two elementary schools in the same district. Jackson found that the mean performance of the LD group on the ETPO was significantly lower than the mean performance of the UC group. He developed cut-off scores which resulted in 70% of the LD and 80% of the UC students being accurately identified.

Brooks (1976) also investigated the usefulness of the ETPO with classified children. He used three groups of 50 children each: learning disabled, emotionally disturbed (ED) and unclassified. The ED group was included for comparison since previous research had indicated that LD and ED children often perform similarly on diagnostic measures. The LD and ED children were randomly selected from populations of 62 LD and 58 ED children in public and private schools in southern New Jersey. These children had been classified by the school district's child study team. The UC children were selected from the school system in which Brooks was employed.

Brooks found significant differences between the three groups on total ETPO scores, with the LD group obtaining the highest ETPO score (most errors) and the UC group the lowest, though post hoc comparisons of these differences were not employed. Brooks also developed his own cut-off scores, but found that LD children at the 6, 7, and 8 year old level were more accurately identified than those at the 9 and 10 year old level.

It was the purpose of the present study to follow up and reassess the students originally tested with the ETPO by Jackson and Brooks in the 1974-75 school year, in order to determine the long term predictive validity of the instrument. Specifically, it was predicted that ETPO scores at Time 1 (1974-75) would significantly and positively relate to classification status at Time 2 (1979). Additionally, the concurrent validity of the ETPO was investigated. It was

predicted that ETPO scores at Time 2 would significantly and positively relate to classification status at Time 2.

METHOD

Subjects

Of the original 190 students in the Brooks and the Jackson studies, a total of 123 were located and retested with the ETPO. These 123 students were located in a total of 28 public and 2 private school systems dispersed throughout southern New Jersey. From the Brooks study, 35 of his 50 LD children, 30 of his 50 ED children, and 37 of his 50 UC children were retested. For the Jackson sample, 14 of his original 20 LD and 7 of his 20 UC students were retested. Because of the loss of 22% of the students in Brook's sample and 47% of the students in Jackson's study, the two groups were combined into a single sample for the analyses of this study, providing a total of 49 LD, 30 ED, and 44 UC children. The students in the combined sample ranged from 10 to 15 years of age.

Procedures

All students were tested with the adult level of the ETPO by one of three trained testers. The testers were not aware of the children's specific classification status, though in several cases the testing took place in schools for educationally handicapped students. All students were tested between January and April of 1979. Each protocol was then scored by a person who was unaware of the classification status of the children. The Time 2 classification status and date of birth of the children were obtained from the school districts that the students were attending.

Analyses

One way ANOVAs with classification status as the independent variable were calculated for total ETPO scores and for each of the four ETPO subtest scores. One set of analyses was performed using Time 1 ETPO scores and Time 2 classification status (predictive validity), and a second set of analyses was performed

using Time 2 ETPO scores and Time 2 classification status (concurrent validity). Direct multiple discriminant analyses were used to determine the accuracy of prediction of classification status at Time 2 by ETPO scores at Time 1 (predictive validity) and Time 2 (concurrent validity) respectively. In order to provide a cross-validation sample for these analyses, the LD, ED and UC groups were randomly divided, with two-thirds of each group constituting the criterion sample and the remaining one-third the cross-validation sample.

RESULTS

The ETPO means, standard deviations, and ranges at Times 1 and 2 for the three classification groups are presented in Table 1. Due to the unequal standard deviations and unequal n's, the raw ETPO scores were logarithmically transformed for the ANOVAs. All F ratios for the ETPO subtests and total scores for Times 1 and 2 were statistically significant, with $p \leq .005$. Scheffe post hoc comparisons were used to analyze these differences, and the results are presented in Table 2. The two sets of post hoc analyses were similar, with the ETPO total score differentiating between the three groups, while the subtest score results were less consistent. The degree of relationship between the ETPO total scores at Times 1 and 2 and classification status at Time 2 were determined by using eta (η). The obtained eta correlation ratios of .49 for Time 1 ETPO scores and Time 2 classification, and of .55 for Time 2 ETPO scores and Time 2 classification, were both significant with $p < .001$.

Classification equations were derived from the direct multiple discriminant procedure for predicting Time 2 classification status using Time 1 ETPO scores, and applied to the criterion sample. An overall predictive accuracy of 59.8% was obtained. However, when cross-validated, the accuracy dropped to 36.7%, indicating extensive overlap in ETPO performance of the LD, ED, and UC groups. Much of the overlap involved the LD and ED groups and accordingly, these scores were collapsed into a single handicapped group (HC). The classification equations were reapplied to the HC and UC groups and the overall predictive

accuracy rose to 68.3% with 67.9% of the UC and 87.3% of the HC students correctly classified. When the classification equations were tested on the cross-validation scores, the overall predictive accuracy was 61.0% with 52.6% for the UC and 68.2% for the HC groups. Similar analyses based on Time 2 classification status by Time 2 ETPO scores yielded an overall predictive accuracy of 78.0%, with 81.6% for the UC and 75.0% for the HC students, these figures dropping to 70.7%, 79.0%, and 63.7%, respectively, for the cross-validation sample.

DISCUSSION

These results provide strong support for the predictive and concurrent validity of the ETPO. In both the predictive and concurrent studies, the total ETPO score was found to significantly and positively relate to classification status. Similarly, the total ETPO score clearly differentiated the LD, ED, and UC groups, both concurrently and over a four year interval. The results for individual subtests were less consistent, providing a rationale for using only total score.

From a practitioner or clinical perspective, the utility of a screening instrument relates not only to the differentiation of groups, but also to the accuracy of individual predictions. If false positive rates are excessively high, large numbers of normal students will be identified for costly diagnostic services. In contrast, if false negative rates are high, large numbers of students potentially needing diagnostic and special educational services will be missed. The failure to provide needed services to the latter students may have an adverse effect on their educational, emotional, and social adjustment (Goodman & Mann, 1978). The ETPO "hit rates" in both the predictive and concurrent studies revealed overlap between the three classification groups; however, much of the overlap involved the ETPO performance of the ED and LD groups. Collapsing the Ed and LD groups into a singular HC (handicap) group resulted in a substantial increase in predictive accuracy. In the predictive cross-validation study, a false positive rate of 47.4% for UC students, and a false negative rate of 31.8% for HC students

were obtained. The false positive rate indicates that approximately one half of the 10 to 15 year old currently UC students performed like HC students when tested four years earlier. Less than one third of the 10 to 15 year old currently classified HC students had performed like UC students when tested originally. It is evident that appreciable errors will be made in using the ETPO to predict classification status of individual UC students over a four year interval.

In contrast, the concurrent corss-validation study revealed a false positive rate of 21.0% for the UC students and a false negative rate of 36.3% for HC students. Less than one fourth of the UC and slightly more than one third of the HC students were misidentified by the ETPO. These hit rates are not excessive in the absolute sense or in comparison to current instruments for screening 10 to 15 year old students. There are few screening instruments which have been developed primarily for this age span, and those that exist lack extensive reliability and validity study (Buros, 1978).

The results pertinent to this study indicate that the ETPO may have greater screening value than originally proposed by Elizur (1965), who had designed the instrument specifically to identify organic subjects. Both LD and ED students can be identified, though not effectively differentiated from one another with the ETPO. The intent of a screening instrument is to signal the need for more intensive diagnostic study to determine whether a disabling problem exists, and the nature of this problem. The ETPO meets the criterion of signaling the need for more intensive diagnostic study for both ED and LD students. It is not crucial at the screening stage that the ETPO differentiates the ED and LD student, since this differentiation is the focus of the diagnostic follow-up.

Increasingly, school systems throughout the nation are being required to identify and provide appropriate special educational services for handicapped students (Davis, 1978). Incorporating the ETPO into a school district's screening system for identifying learning disabled and emotionally disturbed students can

provide objective and valid information to decision makers who are charged with identification responsibilities. Additionally, the ETPO may be of value for screening an even broader range of disabilities than investigated in this study. A previous study (Elizur, 1969) with the ETPO suggests that students with below average intelligence perform poorly on the instrument. Further research is necessary to confirm whether the ETPO can reliably and validly differentiate retarded as well as other possible handicapping disabilities from normally functioning students. To the extent that a broad range of handicapping conditions, in addition to learning disabilities and emotional disturbance, can be effectively identified, the value of the ETPO to school personnel charged with the responsibility of identifying handicapped students will be enhanced.

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TABLE 1

ETPO Means, Standard Deviations, and Ranges for Learning Disabled, Emotionally Disturbed and Normal Students

ETPO	CLASSIFICATION AT TIME 2	TIME 1 SCORES			TIME 2 SCORES		
		MEAN	STANDARD DEVIATION	RANGE	MEAN	STANDARD DEVIATION	RANGE
Designs	LD[a]	9.62	9.85	0-40	12.53	9.87	0-40
	ED[b]	5.03	2.75	1-10	6.29	5.73	0-18
	UC[c]	4.64	6.29	0-30	3.95	4.88	0-20
Digits I	LD	10.14	15.65	0-80	19.59	16.80	0-71
	ED	2.65	3.43	0-10	12.41	12.29	0-46
	UC	2.46	4.23	0-20	6.11	8.82	0-41
Digits II	LD	12.45	16.56	0-80	20.63	19.61	0-86
	ED	4.94	8.13	0-32	10.06	11.38	0-43
	UC	2.96	5.53	0-25	6.40	8.86	0-33
Blocks	LD	4.96	5.16	0-20	5.67	6.66	0-25
	ED	1.82	1.88	0- 7	1.76	2.02	0- 7
	UC	2.00	2.12	0- 9	1.63	2.37	0- 8
Total	LD	37.18	40.87	1-220	58.43	43.07	8-203
	ED	14.44	11.80	2- 54	30.53	22.87	0- 98
	UC	12.06	12.84	0- 48	18.09	19.94	1- 76

Note. LD = Learning Disabled, ED = Emotionally Disturbed, and UC = Unclassified.

[a] $N = 49$

[b] $N = 17$

[c] $N = 57$

TABLE 2

Summary of Scheffé Post Hoc Comparisons of Time 2 Classification Scores at Time 1 and Time 2

ETPO	Scheffé Comparisons Time 1 Scores	Scheffé Comparisons Time 2 Scores
Designs	LD $\overset{a}{>}$ UC ED $\overset{b}{=}$ UC ED = LD	LD > UC UC = ED ED = LD
Digits I	LD = ED > UC	LD = ED > UC
Digits II	LD = ED > UC	LD > UC UC = ED ED = LD
Blocks	LD > UC > ED	LD > ED > UC
Total	LD > ED > UC	LD > ED > UC

Note. LD = Learning Disabled, ED = Emotionally Disturbed, and UC = Unclassified.

$^{a}\overset{<}{>}$: Indicates direction of significant mean differences at $p \leq .05$.

^{b} = : Indicates that mean differences are not significant at $p \leq .05$.